

Dave Jalanti

The Jabiru Engine Installation Process

Installing the 2200 and 3300 model engines

Last month we studied the features and advantages of the Jabiru model 2200 and 3300 engines. This month we'll delve into the installation of these engines.

I'm only going to devote one paragraph to the actual installation of the Jabiru 2200 in my Kitfox IV. The purpose of this article is to share my experience without being so specific that what I say won't apply to Jabiru engine installations in other aircraft.

That said, the installation of the Jabiru 2200 in my plane took some interesting twists and turns. The majority of the gyrations were self-induced as I made the decision not to use the stock Kitfox cowl. Instead, I chose to use a Skyfox cowl, which I acquired from Jabiru. (The Skyfox is an Australian knockoff of the Kitfox fitted with the Jabiru engine.)

Wrongly, I assumed the cowl would fit my plane with little or no modification. When it did not, I researched and discovered that the Skyfox was similar to the Kitfox Model III. My Kitfox Model IV has more rake in the windshield than the Model III, causing the frame members behind the windshield to interfere with the cowl. Consequently, it was necessary to cut away a large portion of the upper cowl to clear the frame, and a new flare had to be constructed to blend



PHOTOS COURTESY DAVE JALANTI

My attempt to use the Australian Skyfox cowling led to a variety of ripple-effect problems, including the need to rework my windshield and instrument panel. The end result, however, is completely acceptable and provides good visibility during taxiing.

the cowl into the windshield.

In the process I also lengthened the windshield because the Skyfox cowl was lower and flatter than the Kitfox cowl. This meant I also had to lower and flatten the instrument panel, which meant fabricating a new glare shield—truly the ripple effect in action. (Other builders are making similar changes to their Kitfox IVs, so I decided to write a detailed how-to document and included a number of photos. This document

is available on a CD through Jabiru USA, www.usjabiru.com, and I'll gladly talk with anyone wanting or needing to know more specifics.)

The Generic Engine Installation

Because the Jabiru 2200 and 3300 engines are so similar, the installation processes for both are virtually the same. However, I will point out some things I'm learning while working with my friend and fellow EAA Chapter 146

member, Bill DeVries, installing a Jabiru 3300 in his Kitfox Series 7.

Jabiru supplies engine mounts for a wide variety of aircraft. Your Jabiru dealer will know if a mount is currently available for your plane, and a list of supplied engine mounts is available on the Jabiru website. If your plane is not on the list, I encourage you to contact your Jabiru dealer; it may be able to fabricate what you need.

I found it easier to install the engine mount to the engine before attaching

the mount to the firewall of my aircraft. If you follow the supplied instructions, the proper installation of the rubber vibration dampers, mounting bushings, and associated hardware is simple. In this process, it is necessary to compress the rubber vibration dampers. I found an automotive valve spring compression tool worked quite well for this job. I'm sure, with some imagination, one or two large C-clamps could also work.

Next you'll need to lift the engine and mount into position on the air-

frame. A small engine hoist works great, and these can generally be rented from a local tool rental shop. In working with Bill on the installation of his 3300, an engine crane made the job a breeze. A block and tackle or a come-along could also be used. In my case, with the 2200 engine weighing only about 130 pounds, a friend and I lifted the engine in place while my wife, Kate, pushed the bolts through the firewall and threaded the nuts on.

Jabiru supplied the engine mount for the 3300 in Bill's Kitfox Series 7, and we found it rather short. That is, there was little room between the back of the engine and the firewall, which would make installing the air induction system problematic. And it may not function correctly if the airflow is restricted. We ascertained that moving the engine forward 2 inches would solve that problem, make more room for the battery, and in general make the engine easier to inspect and maintain.






Simulating the location of the battery to check weight and balance and for clearance with other engine components.

What we didn't know was how much moving the engine might affect the center of gravity (CG). The Kitfox Series 7 was originally designed for the installation of a Rotax 912S engine. Because Bill already had the 912S mount and cowl, we were able to measure and determine that the prop flange of the Rotax would be about 2-1/2 inches further forward than the Jabiru 3300. The complete engine installation of a 912S would weigh about the same as the Jabiru 3300, but because of the reduction drive on the Rotax, the CG of the engine itself would be slightly further forward.

Our suspicion was that moving the

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Jabiru supplies air ducts for all engine installations to insure the cylinder heads receive adequate cooling. Only minor modifications are needed to make them fit a particular installation.

The exhaust system on my Kitfox Model IV.



engine ahead 2 inches shouldn't put us out of the forward CG limit. To be sure, we made some 2-inch spacers that we mounted between the firewall and the engine mount. Then Bill completely assembled all the major components to the airframe. We temporarily placed the remaining components in their relative locations, leveled the plane, and did a preliminary weight and balance. The results were what we expected. The CG was right at the forward limit. Excellent! Adding the pilot, passenger, fuel, and baggage would move the CG back, so Bill will have the full CG envelope to work with when loading the plane. Bill is now working with Jabiru USA to have a new mount built that is 2 inches longer.

The Exhaust System

The final fit of the muffler should be done along with the fitting of the cowling so clearances can be checked. The muffler slips directly onto the exhaust manifold and is retained with four springs. My Jabiru 2200 engine came with the exhaust extensions installed in the muffler. The extensions have a bend in them, so by flipping the muffler 180 degrees, the angle of the exhaust extensions can be changed.

With the 3300 engine, the exhaust



extensions are not installed in the muffler. In fact there aren't even any holes in the muffler to install the extensions. The idea is that once the engine and cowl are fitted, the optimum position for the exhaust extensions can be determined. The downside of this is that builders may not have the capability to cut four holes of the correct diameter in the correct locations in the rather tough stainless steel material the muffler is made of. Then, once this is done, the extensions need to be welded in place. If you can't do this welding, you'll need to find a local shop capable of welding stainless steel.

The engineers at Jabiru wanted to be sure the cylinder heads receive adequate cooling air. So, rather than supplying the engine with baffling that would need to be modified for a particular aircraft—or relying on the builder to have adequate knowledge and skill to fabricate baffling—Jabiru developed fiberglass air ducts that the builder simply fits to the engine. The builder needs only to do some trimming, drill a few holes, and attach rubber strips to the inlet of the ducts to seal against the inside of the cowl. Jabiru supplies ducts for aircraft with either tractor or pusher configurations.

Installing the Propeller

Jabiru supplies prop bushings, a squash plate, spinner, and spinner

bulkheads. Because the mounting bolt length and diameter depends on the prop selected, the builder will have to supply the AN bolts, flat washers, and locknuts. Once the correct hardware is acquired, the actual installation is straightforward. However, depending on the prop selection, you may have to enlarge the holes in the prop bushings. This is best done on a lathe to keep the holes true.

To fit the spinner, you will need to drill some holes and fasten nut plates to the spinner bulkheads. The spinner will need some minor trimming and sanding before painting. The raw edges of the fiberglass spinner will beat up the finish on the prop, so use a couple layers of duct tape to protect the prop during the fitting of the spinner.

Easing Cold Starts

For cold starts, the Bing carburetor has a cable-activated enrichment system rather than a conventional choke. Some pilots with experience flying Jabiru engines told me that cold starts in colder climates are easier if a primer system is used. I live in such a climate, so I opted for installing a primer. There is a convenient port on the carburetor to connect a primer line. A mechanical plunger-type or electric primer can be used. The primer I installed uses a small electric fuel pump, shut-off solenoid valve, and a momentary switch to acti-

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vate the system. This system works well, but it is a bit sensitive. It takes a little time to learn just how long to prime the engine, and it depends on how cold it is. Something to guard against is inadvertent primer activation in flight. This could cause the engine to get more fuel than it can handle, resulting in a very quiet engine! I made a simple guard over the momentary switch to avoid this problem.

The Bing carburetors used on these engines have a short throttle lever. If the plane you are building uses a throttle quadrant or some other lever system, this isn't a problem. If the plane is being built with a push/pull throttle knob, the travel from idle to full throttle is only about 1 inch. This short travel makes it difficult to control the engine speed. I developed a simple-to-install throttle extension that increases the travel of the knob to 2.4 inches. This difference makes the engine much more controllable. Jabiru USA has these extensions available along with installation instructions.

The remainder of the engine installation involves mostly components that mount on the firewall and cables or wires going through the firewall. Once the locations where the throttle and choke cable go through the firewall have been established, it is wise to decide first where to locate the air box, as it is likely the largest item to be installed on the firewall, and acceptable locations are limited. If the battery is to be placed on the firewall, because it is also large, it should be positioned in conjunction with the air box and before all remaining items. If the build-

er decides to use a gascolator, it should be placed next. Basically, after that, the items with the least flexibility should be mounted before things like the voltage regulator or starter relay. Whenever possible, it is good practice to run fuel lines well below electrical wiring.

In general, the engine installation of both the Jabiru 2200 and 3300 engines is quite straightforward. The biggest issue may be fitting the cowl. As more varieties of aircraft begin using Jabiru engines, more ready-to-fit cowls will become available. For example, Bill and I are working on a cowl design for his Jabiru 3300/Kitfox Series 7. If it works out well, a plug may be made from this cowl so reproductions can be made. Currently there are cowls available for the Sonex and Zenith CH 601 and a number of others. Your Jabiru dealer can help you if you are not sure.

Next month: Flying my Jabiru-powered Kitfox IV. 

For more information about Jabiru engines, manufactured by Jabiru Aircraft Pty. Ltd., P.O. Box 5168, Bundaberg West, Queensland 4670, Australia, visit the manufacturer's website at www.jabiru.net.au, or contact a U.S. distributor:

Jabiru USA Sport Aircraft LLC, Shelbyville, Tennessee, www.usjabiru.com

Suncoast Sportplanes, Naples, Florida
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Each month in Power ON, Phillip Lockwood, president of Lockwood Aviation Repair (lockwood@digital.net, www.lockwood-aviation.com), will address common Rotax engine maintenance or operation issues. In addition, readers are invited to send their questions about various alternative engines to our panel of engine "answer men" or to editorial@eaa.org, or

- For HKS engines, write Dana Persiani, danapersiani@yahoo.com.
- For 1/2 VW engines, write Bill Bronson, onehalfvfwguy@sbcglobal.net
- For Corvair engines, write William Wynne, WilliamTCA@aol.com.
- For Subaru engines, write Don Bouchard, dbouchard@earthlink.net.
- For Hirth engines, write Matt Dandar, rpe@bpsom.com.
- For (non-Rotax) two-stroke engines, write Torello Tacchi, tacchi88@bellsouth.net.

We'll reprint questions and answers of interest in upcoming Power ON columns.